



Yong-Kyu JANG
10/055,883

AMENDMENTS TO THE CLAIMS

Please **CANCEL** claims 3 and 17 without prejudice or disclaimer.

Please **AMEND** claims 1, 9-15, 18, 30 and 33, as shown below.

Please **ADD** claims 36-39, as shown below.

The following is a complete list of all claims in this application.

1. (Currently Amended) A display device, comprising:

a substrate comprising:

a pixel region having a pixel for producing an image, the pixel comprising a thin film transistor as a switching device; and

a peripheral region adjoining the pixel region and having a pad connected to the pixel for applying an electrical signal to the pixel, wherein the pad is a gate pad or a data pad;

an insulation layer formed on the pixel region and the peripheral region; and

an opening region formed in the peripheral region, wherein the pad is formed in the opening region and the opening region has a periphery greater than that of the pad.

2. (Previously Presented) The display device of claim 1, wherein the insulation layer has a first thickness in the opening region and a second thickness in the peripheral region except for the opening region, the first thickness being smaller than the second thickness.

3. (Cancelled)

4. (Previously Presented) The display device of claim 2, wherein the second thickness is about 0.3 to about 3.0 μm .

5. (Previously Presented) The display device of claim 2, wherein a difference between the second thickness and the first thickness is about 2.1 to about 2.4 μm .

6. (Previously Presented) The display device of claim 1, wherein a rugged structure is formed on the insulation layer in the pixel region.

7. (Previously Presented) The display device of claim 6, wherein a thickness of the insulation layer in the pixel region is no more than the second thickness.

8. (Previously Presented) The display device of claim 1, wherein the insulation layer comprises:

a first organic insulation layer formed in the pixel region and the peripheral region except for the opening region; and

a second organic insulation layer formed in the pixel region and the peripheral region including the opening region,

wherein the second organic insulation layer has a rugged structure in the pixel region and an opening formed in the opening region and exposing the pad.

9. (Currently Amended) The display device of claim 1, wherein the insulation layer comprises:

a first insulation layer having a reflective electrode pattern in the pixel region and a peripheral pattern in the peripheral region; and

a second insulation layer covering the first insulation layer and having a rugged structure in the pixel region and an opening exposing the pad in the opening region,

wherein the second insulation layer is continuously expanded from the pixel region to the ~~window~~ peripheral region.

10. (Currently Amended) A reflection type liquid crystal display (LCD) device, comprising:

a first substrate having a first region and a second region wherein the first region includes a pixel region on the first substrate where a pixel is formed to produce an image and a peripheral region surrounding the pixel region and a pad connected to the pixel is formed on the second region for applying an electrical signal to the pixel from outside;

a second substrate opposed to the first substrate;

a liquid crystal layer formed between the first substrate and the second substrate;

a reflection electrode formed at the central portion of the first substrate, the reflection electrode having a rugged structure comprising a relatively high portion and a relatively low portion; and

an organic insulation layer formed between the first substrate and the reflection electrode and formed in the first region and the second regions wherein the organic insulation layer has a rugged structure identical to the rugged structure of the reflection electrode at a central portion of

the first region and an opening in the second region to expose the pad, and a second thickness of the organic insulation layer around the opening is less than a first thickness of the organic insulation layer in the peripheral region.

11. (Currently Amended) The reflection type ~~liquid-crystal display~~ LCD device as ~~claimed in~~ of claim 10, wherein the rugged structure comprises a plurality of protrusions and a plurality of grooves.

12. (Currently Amended) The reflection type ~~liquid-crystal display~~ LCD device as ~~claimed in~~ of claim 10, wherein the second thickness is about 0.3 to about 3.0 μm .

13. (Currently Amended) The reflection type ~~liquid-crystal display~~ LCD device as ~~claimed in~~ of claim 10, wherein a difference between the second thickness and the first thickness is about 2.1 to about 2.4 μm .

14. (Currently Amended) The reflection type ~~liquid-crystal display~~ LCD device as ~~claimed in~~ of claim 10, wherein a thickness of the organic insulation layer in the pixel region is no greater than the second thickness.

15. (Currently Amended) A method for manufacturing a display device, comprising the steps of:

forming a pixel in a pixel region of a substrate, the pixel including a thin film transistor as a switching device;

forming a pad in a peripheral region of the substrate, wherein the pad is a gate pad or a data pad;

forming an insulation layer over the pixel region and a peripheral region; and
patterning the ~~insulating~~ insulation layer to form an opening region in the peripheral region, the opening region including the pad and having a periphery greater than that of the pad.

16. (Previously Presented) The method of claim 15, wherein the insulation layer has a first thickness in the opening region and a second thickness in the peripheral region except for the opening region, the first thickness being smaller than the second thickness.

17. (Cancelled)

18. (Currently Amended) The method of claim 15, further comprising a step for forming a reflection electrode on the insulation layer in the pixel region and forming a pad electrode on the pad in the opening ~~second~~ region.

19. (Previously Presented) The method of claim 18, wherein the reflection electrode and the pad electrode are simultaneously formed by coating a metal layer composed of a reflective metal on the insulation layer and by patterning the metal layer.

20. (Previously Presented) The method of claim 15, wherein the step for forming the insulation layer comprises the steps of:

forming a first insulation layer on the substrate;

selectively removing the first insulation layer in the opening region;
forming a second insulation layer in the pixel region and in the peripheral region; and
forming an opening exposing the pad in the second insulation layer in the opening region.

21. (Previously Presented) The method of claim 20, wherein the first insulation layer and the second insulation layer are organic resists.

22. (Previously Presented) The method of claim 20, wherein the step for selectively removing the first insulation layer in the opening region comprises:

forming a contact hole in the first insulation layer for connecting the pixel;
full exposing the first insulation layer with an exposure amount for forming the contact hole after a first mask is positioned over the first insulation layer to remove the first insulation layer; and
developing the exposed first insulation layer.

23. (Previously Presented) The method of claim 20, wherein the step for forming the opening in the second insulation layer comprises the steps of:

forming a rugged structure on the second insulation layer after a second mask is positioned over the second insulation layer;
exposing the second insulation layer with an exposure amount identical to an exposure amount for forming the rugged structure after the second mask for forming the opening is positioned over the second insulation layer; and
developing the exposed second insulation layer.

24. (Previously Presented) The method of claim 15, wherein the step for forming the insulation layer comprises:

forming a first insulation layer on the pixel region and the peripheral region;
patterning the first insulation layer to form a contact hole in the pixel region and to selectively remove the first insulation layer in the opening region;
forming a second insulation layer in the pixel region and the peripheral region; and
forming an opening in the second insulation layer in the opening region.

25. (Previously Presented) The method of claim 24, wherein the step for patterning the first insulation layer further comprises:

positioning a first mask on the first insulation layer for forming a rugged structure and a contact hole;
exposing the first insulation layer with an exposure amount for forming the contact hole;
and
developing the exposed first insulation layer.

26. (Previously Presented) The method of claim 25, wherein the step for forming the opening comprises steps of:

positioning a second mask over the second insulation layer for forming the contact hole and the opening;;
exposing the second insulation layer; and
developing the exposed second insulation layer.

27. (Previously Presented) The method of claim 15, wherein the step for forming the insulation layer comprises steps of:

forming an organic insulation layer on the substrate;
primarily exposing the organic insulation layer with a full exposure amount for removing the organic insulation layer on the pad;
partially exposing the organic insulation layer in the opening region; and
forming an opening in the opening region and partially removing the organic insulation layer around the opening in the opening region by developing the exposed organic insulation layer.

28. (Previously Presented) The method of claim 27, wherein the step for primarily exposing the organic insulation layer comprises steps of:

positioning a first mask over the organic insulation layer; and
exposing the organic insulation layer with a full exposure amount for forming the opening and a contact hole for electrically connecting the pixel.

29. (Previously Presented) The method of claim 28, wherein the step for exposing the organic insulation layer is performed by exposing the organic insulation layer and the second region with a lens exposure amount for forming a reflection electrode on the organic insulation layer.

30. (Currently Amended) A display device comprising:

a substrate comprising:

a pixel region having a pixel formed thereon and a peripheral region; and

a peripheral region having a pad connected to the pixel, wherein the peripheral region has an opening region and the pad is formed within the opening region;

a first insulating layer formed over the pixel region including the pixel and the peripheral region except for the opening region, the first insulating layer fully exposing the pad; and

a second insulating layer formed on the pixel region and the peripheral region including the opening region and having an opening exposing the pad.

31. (Previously Presented) The display device of claim 30, further comprising a rugged structure formed on a surface of the second insulation layer.

32. (Previously Presented) The display device of claim 30, wherein the first insulation layer includes a plurality of grooves, and the second insulation layer has a rugged surface.

33. (Currently Amended) A method of manufacturing a display device, comprising steps of:

forming a pixel in a pixel region of a substrate;

forming a pad in a peripheral region of the substrate, wherein the peripheral region has an opening region and the pad is formed within the opening region, the pad electrically connected to the pixel;

forming a first insulation layer on the pixel region and peripheral region;

removing a portion of the first insulation layer in the opening region to fully expose the pad;

forming a second insulation layer on the first insulation layer and the opening region; and
removing a portion of the second insulation layer to form an opening for exposing the pad; ~~and~~

~~forming a pad electrode on the pad.~~

34. (Previously Presented) The method of claim 33, further comprising a step of forming a rugged structure on a surface of the second insulation layer.

35. (Previously Presented) The method of claim 33, wherein the step of forming a first insulating layer comprises forming a plurality of grooves therein.

36. (New) A display device, comprising:
a substrate comprising:
a pixel region having a pixel; and
a peripheral region adjoining the pixel region and having a pad electrically connected to the pixel; and
an insulation layer formed on the pixel region and the peripheral region, the insulation layer having an opening formed in the peripheral region to expose the pad; and
a bump forming electrical contact with the pad in the opening,
wherein the opening has a periphery larger than that of the bump.

37. (New) The display device of claim 36, further comprising a conductive film having a plurality of conductive balls and forming electrical contact between the bump and the pad.

38. (New) A method for manufacturing a display device, comprising steps of:
forming a pixel in a pixel region of a substrate;
forming a pad in a peripheral region of the substrate;
forming an insulation layer on the pixel region and the peripheral region; and
removing a portion of the insulation layer in the peripheral region to form an opening exposing the pad;
electrically connecting a bump to the pad in the opening,
wherein the opening has a periphery greater than that of the bump.

39. (New) A display device, comprising:
a substrate comprising:
a pixel region having a pixel; and
a peripheral region adjoining the pixel region and having a pad electrically connected to the pixel;
an insulation layer formed on the pixel region and the peripheral region and having an opening formed in the peripheral region to expose the pad; and
a bump electrically connected to the pad in the opening,
wherein an upper surface of the insulation layer is not lower than a lower surface of the bump.